UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,058	07/14/2003	Paul Arthur Layman	Chaudhry 24-16/075903-248	6891

29391 7590 12/15/2004

BEUSSE BROWNLEE WOLTER MORA & MAIRE, P. A.
390 NORTH ORANGE AVENUE
SUITE 2500
ORLANDO, FL 32801

EXAMINER	
LEE, HSIEN MING	

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 12/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/619,058	LAYMAN ET AL.	
	Examiner	Art Unit	
	Hsien-ming Lee	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6,10-12 and 14* is/are rejected.

7)☒ Claim(s) *1,5,7-10,13 and 15-20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

HSIEN-MING LEE
PRIMARY EXAMINER
12/1/2004

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *111103*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Remarks

1. Applicants' cancellation to claims 21-30 is acknowledged. Claims 1-20 are pending in the application.

Specification

2. The disclosure is objected to because of the following informalities:

A brief description of drawings for *each* figure is required. On page 6 of the specification, stating "Figures 3 through 6" and "Figures 9 through 17" does not comply the U.S. practice. See M.P.E.P. 608.01(f). Appropriate correction is required.

Claim Objections

3. Claim 1 is objected to because of the following informalities: "the ion beam" (at line 7) and "the implanted ion dosage" (lines 9~10) lack antecedent basis. Changing into -- **an** ion beam -- and -- **an** implanted ion dosage --, respectively, are suggested. Appropriate correction is required.

In claim 8, at line 4, changing "the lateral dopant concentration " into -- **a** lateral dopant concentration – is suggested.

In claim 10, at line 10, the limitation " one or more" renders indefinite because "more" does not define an upper limit.

In claim 10, at line 14, changing "the ion beam" into -- **an** ion beam -- is suggested.

In claim 15, at line 25, changing "the dopant density" into – **a** dopant density --; and at line 26, changing "the threshold voltage" into -- **a** threshold voltage -- is suggested.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-4, 6, 10-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ooka (JP 8-162424) in view of Tsuchiaki (US 5,444,007).

In re claims 1, 3, 10, 12, Ooka, in Fig. 1 and related text, teaches the claimed method for fabricating a semiconductor region, comprising:

- forming a plurality of doped semiconductor region 34, 36 and 38 on a semiconductor layer 30;
- forming a first material line 33 (i.e. *photoresist*) proximate the plurality of doped semiconductor region 34, 36 and 38 on a top surface of the semiconductor layer 30;
- performing a first tilted ion implantation process through the first material line 33, wherein an ion beam 40 intersects the first material line 33 an angle with respect to the top surface of the semiconductor layer 30 such that the ion beam 40 passes through the first material line 33 prior to striking the plurality of doped semiconductor region 34, 36 and 38, wherein an implanted ion dosage reaching the plurality of doped semiconductor region 34, 36 and 38 to increase the dopant concentration from 34, 36 and 38 to 44, 46 and 48.

Ooka does not teach that the dopant concentration in the doped semiconductor region is dependent on the material line width.

Tsuchiaki, in an analogous art, teaches forming a plurality of material lines 20A with different height and different width on a semiconductor layer 10 (Figs.3D~3E) for tilted ion implantation 15. Tsuchiaki teaches that the plurality of material lines have different window width 31~37, which also reflects a different material line width. Whether or not the implanted ions (i.e. fluorine ions) passing through the material lines would dependent upon the window width (abstract), which also implies dependent upon the material line width.

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time of invention was made, to form different material line width, as taught by Tsuchiaki, before performing the tilted ion implantation of Ooka, since by this manner it would able to control a desired doping profile.

In re claim 2, Ooka teaches forming a first layer of photoresist over the semiconductor layer 30; patterning the first layer of the photoresist to identify the location of the material line 33, and removing the material of the first layer of the photoresist except for the material line, i.e. forming the photoresist layer on the substrate 30 and patterning the photoresist later to form the material lines 33.

In re claim 4, Ooka teaches that tilt angle is in the range of about 1 and 89 degree, as illustrated in Fig.1.

In re claim 6, Tsuchiaki also remedies the deficiency in Ooka because Tsuchiaki teaches that the height of the material lines 20 would affect the ion implantation profile (Fig.3E and col. 5, lines 2-5, col. 6, lines 47-52).

In re claim 11, Ooka teaches that the doped semiconductor region 34 or 36 or 38 is semiconductor well.

In re claim 14, Tsuchiaki also remedies the deficiency in Ooka because Tsuchiaki teaches that the height and the width of the material lines 20 would affect the ion implantation profile (Figs.3D~3E, abstract, and col. 5, lines 2-5, col. 6, lines 47-52).

Allowable Subject Matter

6. Claims 5, 7-9 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claim 15 would be allowable if rewritten or amended to overcome the objection as set forth in this Office action.

8. Claims 16-20 are objected to as being dependent upon an objected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record at least neither teaches nor suggests that the width of the material line is selected to control the ion implantation dosage (claim 5); performing a second tilted ion implantation through a second material line (claims 7 and 13); the lateral dopant concentration in the doped semiconductor region after the first and the second tilted ion implantation is uniform (claim 8); and in each of the plurality of semiconductor wells, forming an oxide layer on a region of the semiconductor layer, wherein the region below the oxide layer defines a channel region, forming a gate region over the oxide layer in each one of the plurality of semiconductor wells, forming a source and a drain region in each one of the plurality of doped semiconductor wells with the channel region therebetween (claim 15).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-ming Lee whose telephone number is 571-272-1863. The examiner can normally be reached on Tuesday-Thursday (8:00 ~ 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hsien-ming Lee
Primary Examiner
Art Unit 2823

Dec. 11, 2004

HSIEN-MING LEE
PRIMARY EXAMINER

12/11/2004